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ROBERT M BAUER, ESQ.
MacDonald Illig Jones & Britton LLP
Suite 700
100 State Street
Erie, PA 16507-1459

EXAMINER	
SINGH, HIRDEPAL	
ART UNIT	PAPER NUMBER
2611	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/520,383	COERSMEIER, EDMUND	
	Examiner	Art Unit	
	HIRDEPAL SINGH	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 April 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6 and 8-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6, 8-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This action is in response to the amendment filed with request for continued examination, claims 1-6 and 8-16 are pending and have been considered below.

Response to Arguments

2. Applicant's arguments with respect to claims 1-6 and 8-16 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-6 and 8-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. Claim 1 recites the limitation "...the gradient of the expectation of the square... said transmission..." in lines 7-8. There is insufficient antecedent basis for this limitation in the claim.

6. Claim 11 recites the limitation "...the gradient of the expectation of the square... said transmission characteristic" in lines 8-9. There is insufficient antecedent basis for this limitation in the claim.

7. Claim 16 recites the limitation "... an output signal of said signal processing..." in lines 3-4. There is insufficient antecedent basis for this limitation in the claim.

8. Claim 16 recites the limitation "…the gradient of the expectation of the square... said transmission characteristic" in lines 8-9. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 1, 2, 4-6, 8 and 11-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wright et al. (US 6,313,703) in view of Pare, Jr. et al. (US 6,834,109).

Regarding Claims 1, 11 and 16:

Wright et al discloses a system and method for pre-equalization, comprising:

obtaining a difference between an output signal of a signal processing circuitry and an input signal of an pre-equalizing function (figure 20; figure 21; column 31, lines 15-26 and 45-55; equation 22 in column 32), wherein said input signal is filtered by said pre-equalizing function and the output signal of said pre-equalizing function is input to said signal processing circuitry (pre-equalizer 21 in figures 2-3, as shown pre-equalizer filters the input signal see figure 9, and send output to signal processing circuitry, as described in present invention the pre-equalizer 15 in figures 1-3 is equivalent to pre-equalizer 21 in Wright);

updating control values of said equalizing function (column 4, lines 38-42; column 9, lines 5-11) based on said approximated gradient (column 23, lines 60-67);

wherein said transmission characteristic of said signal processing circuitry is approximated as a delay function (figures 14 and 16; column 26 line 54 - column 27 line 5; as described in present invention, specification page 8 the approximation circuit 73 may be adapted to implement filter characteristic …as delay block or function; similarly Wright's adaptation circuit 28 in figure 14 has delay block or function as specifically shown in figure 16 and described in related columns as above).

Wright discloses all of the subject matter as described above and further discloses calculating an approximation of a gradient of expectation of said difference based on said obtained difference and an approximation of a transmission characteristic (column 21, lines 15-20; equations 22-24 in column 32; column 23, lines 60-67; column 19, lines 38-44; columns 53-54, see step 2), except that the calculated approximation is based on a gradient of expectation of a square of said difference based on said obtained difference and an approximation of a transmission characteristic.

However, Pare, Jr. in the same field of endeavor discloses apparatus and method for mitigation of disturbers in communication system see figures 20-22, by calculating an approximation of a gradient of expectation of a square of said difference based on said obtained difference and an approximation of a transmission characteristic (column 28, line 60 - column 29, line 40).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use the teachings of Pare Jr. in the Wright system to calculate the approximate gradient of based on based on expected value of squared error signal in order to compensate non linearities and interferences as cross talk interference in the communication system by determining and estimation of interference and non linearities that may be caused by external sources or are due to system internal components for getting optimal and predictable performance.

Regarding Claim 2:

Wright et al discloses all of the subject matter as described above and further discloses calculating an approximation of a least mean square gradient vector (column 23, lines 62-65) of said difference.

Regarding Claims 4 and 12:

Wright et al discloses all of the subject matter as described above and further discloses the difference or error is obtained by comparing signal envelopes of said output and input signals (figures 20 and 221; column 31, lines 35-42).

Regarding Claim 5:

Wright et al discloses all of the subject matter as described above and further discloses input signal is a digital signal and said output signal is an analog signal (12 and 18 in figure 2; column 4, lines 10-16).

Regarding Claim 6:

Wright et al discloses all of the subject matter as described above and further discloses the control values are coefficients of an adaptive digital filter (92, 93 in figure 9 are digital filters; figure 10A shows coefficients of filters).

Regarding Claim 8:

Wright et al discloses all of the subject matter as described above and further discloses the delay function corresponds to the position of the maximum analog filter peak of said transmission characteristic (column 25, lines 30-34).

Regarding Claim 13:

Wright et al discloses all of the subject matter as described above and further discloses calculating an approximation of a least mean square gradient vector (column 23, lines 62-65) of said difference and the transmission characteristic is approximated as a delay function (as clearly shown if figure 13 which is block 28 of figure 2; column 22, lines 50-62, where the signal values are filled in memory to hold i.e. delayed before further processing).

Regarding Claim 14:

Wright et al discloses all of the subject matter as described above and further discloses signal processing circuitry is a direct conversion (column 10, lines 15-22) or heterodyne transmitter architecture.

Regarding Claim 15:

Wright et al discloses all of the subject matter as described above and further discloses the apparatus comprises a digital pre-equalizer means (clearly shown in figure 2, the pre-equalizing means for pre distorting the signal is in the digital domain).

11. Claims 3 and 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wright et al. (US 6,313,703) in view of Pare, Jr. et al. (US 6,834,109) as applied to claims 1, 2, and 8 above, in view of Daniel et al. ("JOINT GRADIENT-BASED TIME DELAY ESIMATION AND ADAPTIVE FILTERING" IEEE CH2868; pages 3165-3169; 1990)

Regarding Claim 3:

Wright et al discloses all of the subject matter as described above except for specifically teaching the gradient vector is calculated from a partial differential equation of a system cost function.

However, Daniel et al in the same field of endeavor discloses an adaptive filter using gradient based time delay estimation and further discloses that the gradient i.e. the function for updating the adaptation coefficients is in the form of a differential equation (page 3167, equations 24-26, 38-39).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use the partial differential equation of system cost function to get the gradient vector for updating adaptation coeffients to take advantage of partial differential equations as they are used to formulate and solve problems that involve unknown functions of several variables as in this case the filter circuit characteristics, temperature changes and supply voltage. Using the partial differential equation to formulate the gradient based on the error value of input and output signals makes it easier to keep the adaptation means updated.

Regarding Claim 9:

Wright et al discloses all of the subject matter as described above except for specifically teaching the gradient vector is calculated using the following equation:

$\nabla\{E\} = -2e[k].\ d[k- x]$,

wherein $\nabla\{E\}$ denotes said gradient vector, e[k] denotes said obtained difference, and d[k - x] denotes a vector representation of said input signal assessed by said delay approximation of said transmission characteristic.

However, Daniel et al in the same field of endeavor discloses an adaptive filter using gradient based time delay estimation where the filter coefficients are updated according to the equation $E[Wn + 1] = E[Wn] + 2\mu E[e(n,dn) Un]$, where e_n is the error/difference signal and Un is a delayed input vector (page 3167, equation 43). This equation can be written in the form of a gradient i.e. in the form of ratio of different variables where $E [Wn + 1] - E [Wn] = 2\ \mu\ E [e (n, dn) Un]$ and the gradient vector is calculated.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to update the adaptation values based on the gradient of the difference between output and input values where the input is a delayed function in order to make the adaptation coefficients which reflects the distortions and discrepancies in the filtering circuit when the error signal is compared to the delayed input signal, to keep track of the time varying delays in the path of signals going through separate processes.

Regarding Claim 10:

Wright et al discloses all of the subject matter as described above except for specifically teaching the filter coefficients are updated in said updating step based on the following equation:

$w[k + 1] = w[k] + \mu e[k] \cdot d[k- \tau]$,

wherein w[k + 1] denotes a vector representation of updated filter coefficients, w[k] denotes a vector representation of current filter coefficients, and μ denotes a predetermined proportionality factor.

However, Daniel et al in the same field of endeavor discloses an adaptive filter using gradient based time delay estimation where the filter co-efficients are updated according to the equation $w[n + 1] = w[n] + 2\mu e^*$ Un, where Un is a delayed input vector (page 3166, equation 20).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to update the adaptation coefficients based on the previous value and the error signal and the delayed input signal in order to make it easier for the system just to update the previous coefficients and not to determine the new ones as just making the required changes in the previous value saves some extra calculation and time and makes the system less complex.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Cavers et al. (US 2003/ 0011427) discloses a decorrelated power amplifier linearizer with pre-equalization with delay function where adaptation is based on difference between input and processed signal.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HIRDEPAL SINGH whose telephone number is (571) 270-1688. The examiner can normally be reached on Mon-Fri (Alternate Friday Off) 8:30AM-6:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on 571-272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/H. S./
Examiner, Art Unit 2611
/Shuwang Liu/ Supervisory Patent Examiner, Art Unit 2611